6. $f(x)=\ln(x)^2$ $x>0$ $g(x)=e^{2x}$ $x\geq 0$ range $y\geq 1$

$h(x)=f(g(x))$ $k(x)=g(f(x))$

a domain of h

$x\geq 0$

$h(x)=\ln((e^{2x})^2)$

$=\ln e^{4x}$

$=4x\ln e$

$=4x$

domain of $k(x)$

$y\geq 1$

$k(x)=e^{2\ln x^2}$

$=e^{\ln x^4}=x^4$

Mar 4-9:48 AM

Review 3 magnitude, Continuity

(how fast functions grow)

Continuity

$f(x)$ is continuous on (a,b)

no undefined, draw without lifting pencil

no holes, no jumps, no gaps

$f(x)$ is continuous at $x=c$

$\lim_{x\to c} f(x)=f(c)$

1. $\lim_{x\to c} f(x)$ exists
2. $f(c)$ exists
3. $\lim_{x\to c} f(x)=f(c)$

If $f(x)$ is differentiable then $f(x)$ is continuous

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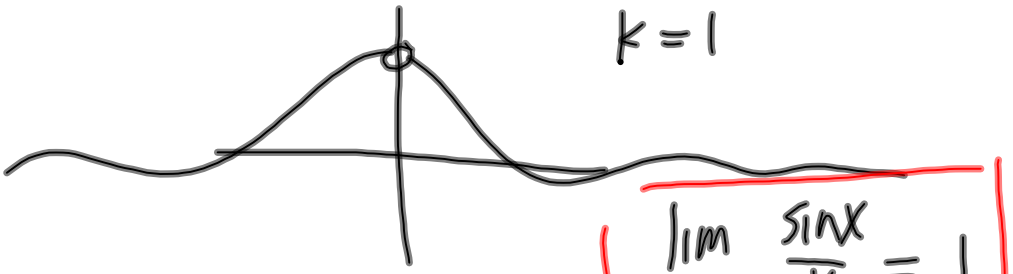
$$f(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ k & x = 0 \end{cases}$$

What value of k makes $f(x)$ continuous?



$$\lim_{x \to c} \frac{\sin x}{x} = 1$$

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order of magnitude

$f(x)$ & $g(x)$ grow at same rate

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = L \qquad 0 < L < \infty \text{ same}$$

$L = 0$ g faster

$L = \infty$ f faster

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